

MTH 153–FUNCTIONS (FCN): SAMPLE EXAM

We use $\log_a(x)$ to denote the log to the base a of x and $\ln(x)$ to denote the natural logarithm of x .

PROBLEM 1. Solve the equation

$$x^3 + 41x = 360 - 8x^2$$

The smallest solution is closest to

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|--------|-------|-------|-------|-------|
| A. 4 | B. 2 | C. -2 | D. 6 | E. -6 |
| F. -10 | G. -4 | H. 0 | I. 10 | J. -8 |
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PROBLEM 2. An orchardman has 132 pounds of apples. He can sell them all for \$0.30 per pound or try to get a higher price. He estimates that each 1 cent per pound increase will make 2 pounds of apples unsellable and worthless. To maximize the revenue he should make the price per pound (in cents) closest to

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|-------|-------|-------|-------|-------|
| A. 45 | B. 46 | C. 47 | D. 48 | E. 49 |
| F. 50 | G. 51 | H. 52 | I. 53 | J. 54 |

PROBLEM 3. His total revenue (in cents) is closest to

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|---------|---------|---------|---------|---------|
| A. 4400 | B. 4425 | C. 4450 | D. 4475 | E. 4500 |
| F. 4525 | G. 4550 | H. 4575 | I. 4600 | J. 4625 |
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PROBLEM 4. Assume that the cost function is linear. The fixed cost for producing ceramic tiles is \$6,500, while the total cost of producing 4,500 boxes of tiles is \$82,000. The marginal cost in dollars for producing one box of tiles is closest to:

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|---------|---------|---------|---------|---------|
| A. \$15 | B. \$13 | C. \$3 | D. \$1 | E. \$11 |
| F. \$21 | G. \$5 | H. \$19 | I. \$17 | J. \$9 |

PROBLEM 5. The cost of producing 2,500 boxes of tiles is closest to:

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|-------------|-------------|--------------|--------------|-------------|
| A. \$80,000 | B. \$50,000 | C. \$20,000 | D. \$100,000 | E. \$90,000 |
| F. \$40,000 | G. \$60,000 | H. \$110,000 | I. \$30,000 | J. \$10,000 |
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PROBLEM 6. Solve the equation $2^{(x^2)} = 16$. The smallest or only solution is closest to

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|-------|-------|-------|-------|-------|
| A. -7 | B. -6 | C. -5 | D. -4 | E. -3 |
| F. -2 | G. -1 | H. 0 | I. 1 | J. 2 |

EXAM CONTINUES ON BACK OF SHEET

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PROBLEM 7. Solve the equation $4^x = 12$. The smallest or only solution, if it exists, is closest to

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|--------|--------|--------|--------|--------|
| A. 1.3 | B. 1.6 | C. 1.1 | D. 1.8 | E. 1.7 |
| F. 1.2 | G. 1.9 | H. 1.5 | I. 1.4 | J. 2.0 |
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PROBLEM 8. Simplify the expression

$$\frac{(xy^2)^{-2}}{x^2y^{-3}}$$

There should be at most one occurrence of each letter and all exponents should be positive. The simplified form is

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|---------------------|----------------------|----------------------|----------------------|---------------------|
| A. $\frac{y}{x}$ | B. $\frac{y^8}{x}$ | C. $\frac{x^5}{y^5}$ | D. $\frac{y^3}{x^7}$ | E. x |
| F. $\frac{1}{x^4y}$ | G. $\frac{x^3}{y^5}$ | H. $\frac{y}{x^8}$ | I. x^6y^5 | J. Not listed here. |
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PROBLEM 9. Richter Scale earthquake rating is $R = \log_{10}(I/I_0)$ where I_0 is the intensity of a small standard quake. The 1971 Los Angeles quake measured 6.7 on the Richter Scale. The 1986 Cleveland quake measured 3.7. How many times more intense was the Los Angeles quake? The number is closest to:

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|--------|--------|---------|---------|---------|
| A. 300 | B. 400 | C. 500 | D. 600 | E. 700 |
| F. 800 | G. 900 | H. 1000 | I. 1100 | J. 1200 |
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PROBLEM 10. Solve $x = 5\ln(7 + 3y)$ for y . Which of the following is y ?

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|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| A. $\frac{e^{\frac{x}{5}}-3}{7}$ | B. $\frac{3-e^{\frac{x}{7}}}{5}$ | C. $\frac{7-e^{\frac{x}{3}}}{5}$ | D. $\frac{e^{\frac{x}{7}}-5}{3}$ | E. $\frac{e^{\frac{x}{7}}-3}{5}$ |
| F. $\frac{5-e^{\frac{x}{3}}}{7}$ | G. $\frac{e^{\frac{x}{3}}-7}{3}$ | H. $\frac{e^{\frac{x}{3}}-5}{7}$ | I. $\frac{3-e^{\frac{x}{5}}}{7}$ | J. Not listed here. |
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PROBLEM 11. Choose the equivalent rational exponent expression for:

$$-4\sqrt{\sqrt{x}}$$

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|-------------------------|---------------------------|------------------------|--------------------------|---------------------------|
| A. $(4x)^{\frac{1}{4}}$ | B. $(-4x)^{-\frac{1}{4}}$ | C. $4x$ | D. $4x^{-\frac{1}{4}}$ | E. $(4x)^{-\frac{1}{4}}$ |
| F. $-4x^{-\frac{1}{4}}$ | G. $4x^{\frac{1}{4}}$ | H. $-4x^{\frac{1}{4}}$ | I. $-(4x)^{\frac{1}{4}}$ | J. $-(4x)^{-\frac{1}{4}}$ |
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PROBLEM 12. A man has 3 times as much money invested in 12% bonds as he has in stocks paying 9%. If his yearly income from the investments is \$2,700, his total investment is closest to

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|-------------|-------------|-------------|-------------|-------------|
| A. \$21,000 | B. \$30,000 | C. \$22,000 | D. \$28,000 | E. \$23,000 |
| F. \$26,000 | G. \$27,000 | H. \$29,000 | I. \$24,000 | J. \$25,000 |

The correct answers are: 1-A, 2-D, 3-I, 4-I, 5-B, 6-F, 7-D, 8-F, 9-H, 10-G, 11-H, 12-I