

**CALCULUS I – Worksheet #62**

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1. (Free Response – you may use your calculator) At time  $t$ ,  $0 \leq t \leq 10$ , the velocity of a particle moving along the  $x$ -axis is given by the following equation:  $v(t) = 1 - 4\sin(2t) - 7\cos t$ .
- Is the particle moving left or right at  $t = 5$  seconds? Explain your reasoning.
  - What is the average velocity of the particle from  $t = 0$  to  $t = 10$ ?
  - What is the average acceleration of the particle from  $t = 0$  to  $t = 10$ ?
  - Given that  $p(t)$  is the position of the particle at time  $t$  and  $p(0) = 5$ , find  $p(2)$ .
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2.  $\int_0^1 e^{2x} dx =$       A)  $e^2 - 1$       B)  $e^2$       C)  $\frac{e^2}{2}$       D)  $\frac{e^2 - 1}{2}$       E)  $2e^2 - 2$
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3. At which of the following points is the graph of  $f(x) = x^4 - 2x^3 - 2x^2 - 7$  decreasing and concave down?  
A) (1,10)      B) (2,-15)      C) (3,2)      D) (-1,-6)      E) (-2,17)
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4. Let  $f$  and  $g$  be twice differentiable functions such that  $f'(x) \geq 0$  for all  $x$  in the domain of  $f$ .  
If  $h(x) = f(g'(x))$  and  $h'(3) = -2$ , then at  $x = 3$   
A)  $h$  is concave down.    B)  $g$  is decreasing    C)  $f$  is concave down.    D)  $g$  is concave down    E)  $f$  is decreasing
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5.  $\int_0^{\pi/4} \sin 2x dx =$       A)  $-1$       B)  $-\frac{1}{2}$       C)  $0$       D)  $\frac{1}{2}$       E)  $1$
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6.  $\lim_{h \rightarrow 0} \frac{\tan 2(\frac{\pi}{8} + h) - \tan \frac{\pi}{4}}{h} =$       A)  $\frac{3}{2}$       B)  $2$       C)  $2\sqrt{2}$       D)  $4$       E)  $4\sqrt{2}$
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7. If  $f(x) = \begin{cases} e^x, & x < \ln 2 \\ 2, & x \geq \ln 2 \end{cases}$  then  $\lim_{x \rightarrow \ln 2} f(x) =$       A)  $\frac{1}{2}$       B)  $\ln 2$       C)  $2$       D)  $e^2$       E) It is nonexistent.
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8. Let  $f$  be a function such that  $\lim_{h \rightarrow 0} \frac{f(5-h) - f(5)}{h} = 3$ . Which of the following must be true?
- $f(5) = 3$
  - $f'(5) = 3$
  - $f$  is continuous and differentiable at  $x = 5$ .
- A) I only      B) II only      C) III only      D) I and II only      E) III and III only
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