100 POINTS POSSIBLE/BOX YOUR FINAL ANSWER
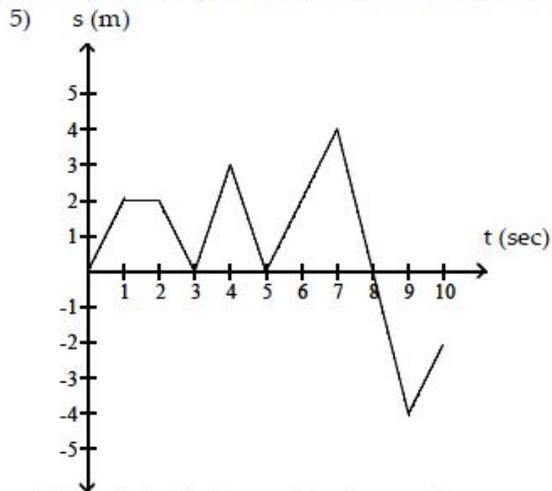SHOW ALL WORK FOR FULL CREDIT!!!
1.   (5 POINTS)

The equation gives the position s = f(t) of a body moving on a coordinate line (s in meters, t in seconds)

5)   s (m)

When is the body moving forward?

(48 POINTS) Problems 2-7. Find the derivative of the functions below with respect to the independent variable. Each item is worth 8 points. EXACT, FULLY SIMPLIFIED ANSWERS ONLY!!! This means a single rational expression which has NO COMPLEX FRACTIONS or negative powers.

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2. $f(x) = \dfrac{x^2 + 2x + 3\sqrt{x}}{\sqrt[3]{x^2}}$

3. $y = \cos^2\left(\sqrt{x}\right)$

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4. $h(t) = \dfrac{5 - \sqrt{t}}{5 + \sqrt{t}}$

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5. $f(x) = \sqrt{\sqrt{x} + 7}$

6. $y = x(4-x)^{1/3}$

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7. $f(\theta) = \dfrac{\csc\theta}{\theta}$

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8.   (8 POINTS) Find the derivative with respect to *x*.

       $\tan(x+y) = x$

9. (10 POINTS) Find the x-values which yield horizontal tangent lines over the interval $(0,\pi)$ if $f(x) = 2\cos x + \sin 2x$.

10. (10 POINTS) Find $\dfrac{d^2 y}{dx^2}$ of $1 - xy = x - y$ in terms of x and y.

11. (8 POINTS) The curve $y = ax^2 + bx + c$ passes through the point $(2,8)$ and is tangent to the line $y = 2x$ at the origin. Find a, b, and c.

12. (5 POINTS) A spherical balloon is inflated with helium at the rate of 100π ft^3/min. How fast is the balloon's radius increasing at the instant the radius is 5 ft? (Given: $V = \frac{4}{3}\pi r^3$)

13. (6 POINTS) Use the **LIMIT PROCESS** find the derivative of $f(x) = \sin x$.